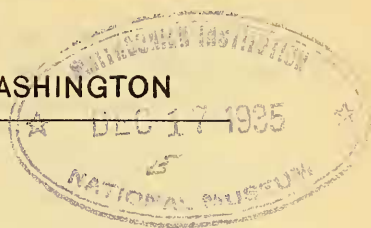


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NOTES ON THE BEHAVIOR OF *COTINIS NITIDA* L.  
AND ITS BIRD ENEMIES.

By F. H. CHITTENDEN.

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Some studies of the behavior of *Cotinis nitida* L., known in economic literature as the green June beetle, and two of its bird enemies were conducted during the summer and fall of 1922 and later at Washington, D. C. Beetles deposited their eggs where they were attracted by loose, heavily manured soil. The larvae grew apace and toward the middle of August were from about two-thirds to three-fourths grown. After a heavy rainfall on September 2, large numbers of them crawled to the surface and became distributed to other portions of the yard in which they were breeding, not only in that which had been manured but in hard, compact soil as well. A similar occurrence was observed in later years. In the compact soil it was noticed that the larvae frequently came to the surface to extrude excrementitious matter and earth, and by September 13 larvae not only came up from this hard earth but left tracks on it, showing that they had taken short trips of 2 or 3 inches in length overnight and apparently returned into the same holes, a habit which seems unusual for a larva. It was noticeable that the grubs more frequently came out from the soil where there were small tufts of grass, as in these locations the earth is comparatively soft.

During October, 1922, there were several cool spells and some warm days, when a few larvae were captured by means of a small tin can, like the "cup" used by golfers, inserted into and level with the ground. These captures showed that the larvae were rapidly attaining full growth after the first days of October in spite of sudden atmospheric changes. The larvae at this time always opened the orifices to their tunnels at night, and

only on two occasions were they observed to crawl about on the surface, the evidence consisting of the short trails which they left in so doing.

During the last week of April, 1923, on two occasions after storms, a pair of starlings was observed devouring *Cotinis* larvae from the openings of their burrows. The starlings, which previously had been quite shy, were apparently gorged with the feast and could be approached closely. It appears quite possible that starlings might learn to follow the plow for white grubs in the same manner as do blackbirds.

On February 24, 1925, a starling was heard at work about daybreak where *Cotinis* larvae had hibernated. The ground had been damp for several days and the temperature was about 56° F. at the time of the first observation. A little later this starling was joined by a second and together they thrust their beaks into the larval exit holes and destroyed many specimens. There were large areas where a dozen holes to the foot could be counted. While feeding on these large larvae the starlings make a peculiar sound somewhat similar to the grunting of a pig or some other mammal, combined with a choking squeak. A little later on the following morning, with a temperature of 45° F., a pair was observed searching for larvae but unsuccessfully, since an examination of the earth showed that what larvae remained alive had evidently gone deeply into their burrows. Following this, the temperature sank to a point where the larvae were no longer active and as a result the starlings were not observed again attacking them until a warm spell, beginning March 8.

There is evidence of an unusual attraction of the green June beetle to the cardinal and *vice versa*. When a bird alights among a lot of them where they congregate in bright sunlight and begins pecking at them, some fly directly at the bird as though in actual combat, giving the impression that the bird, because of its bright color, attracts the beetle. It was surmised at the time that the insect might mistake the bird for a flower. That this surmise may be correct is borne out by the observation of Dr. T. E. Snyder at Norfolk, Va., in July, 1925, that the beetles are strongly attracted to red varieties of *Canna*. The bird dodges the beetles without apparent effort and without leaving the ground, but pecks those that approach closely.

One beetle which had been freshly killed was placed where a cardinal would have access to it, and after the bird's departure, it was found that practically the entire body had been consumed, a mere trace of some of the hard parts remaining.

When the beetles issued the second week in July in 1925, the starlings were not in evidence, but the cardinals appeared a few days later, evidently searching for the beetles, which were extremely rare.

Although the notes which are here presented are fragmentary, owing chiefly to the activities of the starlings in destroying the larvae, nevertheless the observations made are suggestive of interesting behavior, and the object in presenting them now is to call attention to the possibilities of verifying just such traits for permanent records.